

REMARKS

In response to the Office Action dated April 20, 2007, claims 1-7, 9-12 and 14 have been amended. Claims 8 and 13 have been cancelled. In view of the foregoing amendments and the following remarks, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration and allowance of the present application is respectfully requested.

OBJECTIONS TO THE DRAWINGS

The drawings have been objected to since the drawings did not show the feature of the invention as described in claim 13. The cancellation of claim 13 has rendered the objection to the drawings moot.

CLAIM REJECTIONS UNDER 35 U.S.C. 102

Claims 1, 3, 4, 6-9, 13 and 14 have been rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,645,114 to Biallas ("Biallas"). This rejection is respectfully traversed.

Claim 1 has been amended to more particularly claim the invention. According to amended claim 1, "each gear ratio is defined by a respective power sub-path; there is one gradual selective activator for each power sub-path; each power sub-path is permanent between the upper shaft and the lower shaft except for possible interruption by the corresponding activator."

The features of multiple power sub-paths among each power path with a single possible interruption of each sub-path is described in the application as filed with reference to the general explanation of the invention in view of Figs. 1 and 2, and was also mentioned in initial claims 7 and 8.

Referring to the more specific embodiment of Figure 5, there are six gradual activators 118a, 218a, 318a, 118b, 218b, 318b for five forward gears and one reverse gear. Each respectively corresponding power sub-path is definitely and unavoidably activated for power transmission if the related activator is engaged, and deactivated if the same related activator is disengaged.

Thus, when a gradual selective activator according to claim 1 is getting engaged, a torque-transmission relationship is established throughout one of the power sub-paths and the corresponding transmission ratio starts to prevail. All the other activators are in a disengaged condition.

When all the gradual activators of a same power path are disengaged, the power path as a whole is deactivated, i.e., has no influence upon the relative speed of the upper and lower shafts with respect to each other. When all the power paths are deactivated, the transmission operates in "Neutral."

Shifting from an "old" transmission ratio into a "new transmission ratio is completed by (preferably gradually) disengaging the activator corresponding to the old transmission ratio and gradually engaging the activator corresponding to the new transmission ratio, independently of whether the old and the new transmission ratios are available by means of two power sub-paths belonging to one and the same power path or on the contrary by means of power sub-paths belonging to two different power paths.

As stated in the description of the application as filed (page 2, lines 28-30), the function of activating (in fact selecting and activating) and the function of adapting the speeds of the upper shaft and lower shaft are merged together in a single activator (one for each transmission ratio).

According to Biallas, two kinds of selective couplings are provided and at least two selective couplings (even three along the central power path 16) must be engaged for activating one transmission ratio.

More specifically, along each sub-path, there is provided a gradual coupling means 24, 44, 64 (which is common to all sub-paths of a same power path) in series with a synchronizer coupler (34, 48, 68). In the central path, each of the sub-paths respectively corresponding to the fourth gear and to the reverse gear even comprises three successive couplings which all need be engaged for activating the sub-path.

To summarize, each sub-path needs operation of at least two couplings (one or more synchronized selectors and one gradual coupling) for activating one power sub-path. Accordingly, the known gearbox needs more coupling devices, and needs several successive controls to be operated for a gear shifting.

The procedure for shifting from an old transmission ratio to a new transmission ratio pertaining to a different power path allows the duration of interruption of the lower shaft drive to be very short. This procedure is however complicated and requires complicated controls. More specifically, this procedure requires the following steps: (i) predicting the new gear ratio which will be appropriate; (ii) preparing the new gear ratio by appropriately positioning the

corresponding synchronizers of the corresponding power path while the gradual coupler of this power path is still open; (iii) opening the gradual coupler of the power path which has transmitted power up to now; and (iv) closing the gradual coupler of the “new” power path.

This is complicated. If the new ratio pertains to the same power path as the old transmission ratio, the procedure is similarly complicated, but different, so that the system must contain two different control sequences. As a matter of fact, in this second case, it is no longer possible to prepare the new ratio in an inactive power path because the new ratio is available only through the power path which is currently active. Therefore, either the system will preclude such a shifting, e.g., will preclude the shift directly between first to fourth gear (both pertaining to Biallas’ central power path), or a specific procedure for such a shifting will be necessary, as follows: (i) disengaging the gradual coupling of the currently active power path; (ii) changing position of the synchronized couplers of the same power path; and (iii) reengaging the gradual coupling.

A further drawback is that the quick-shifting capability of Biallas’ multi-power path gearbox is lost in the latter case, i.e., when shifting occurs between two gear ratios available through one and the same power path because in such a case power transmission to the lower shaft is interrupted during the whole shifting process. As a whole, Biallas is typical of the prior art already discussed in the introductory part of the description of the present application.

The invention remedies all these drawbacks because gear shifting only needs disengaging the gradual coupling which was transmitting power up to now, and thereafter or substantially simultaneously engaging a selected one of the gradual activators, on the same power path or on a different power path.

The above clearly distinguishes amended claim 1 over Biallas. Therefore, claim 1 is now allowable. Since claims 3, 4, 6-9, 13 and 14 depend directly from claim 1, these claims are also allowable. Accordingly, withdrawal of the rejection under 35 U.S.C. 102 is respectfully requested.

CLAIM REJECTIONS UNDER 35 U.S.C. 103

Claims 1, 3, 4, 6-9, 13 and 14 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Biallas in view of U.S. Patent No. 5,342,258 to Egyed (“Egyed”).

Applicants reiterate the arguments presented in the claim objections under 35 U.S.C. 102(b). Further, Egyed has only one power path.

Claims 5 and 12 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Biallas in view of U.K. Patent No. 2112883 to Ashfield ("Ashfield").

Applicants reiterate the arguments presented in the claim objections under 35 U.S.C. 102(b). In addition, Ashfield simultaneously energizes the two power paths 32, 33 through a differential gear 31, as already apparent from the first sentence of the abstract. Two clutches need be engaged for establishing one gear ratio. If only one clutch is engaged, all the power will be directed by the differential to the path 32 or 33 where no clutch is engaged. Accordingly, it cannot be said that each power sub-path is only interruptible by a single activator between the upper shaft and the lower shaft. Furthermore, the clutches are not adapted to gradually match the engine and load speeds: and input clutch (not shown) is moreover provided, see col. 1, lines 35-37.

In view of the above, the rejections under 35 U.S.C. 103(a) are believed to be overcome. Accordingly, claim 1 and all the claims dependent therefrom are now believed to be allowable and withdrawal of the rejections under 35 U.S.C. 103 is respectfully requested.

OBJECTIONS TO CLAIMS 10 AND 11

In paragraph 8 of the Office Action, the Examiner objected to claims 10 and 11 as being dependent upon a rejected base claim but would be allowable if rewritten in independent form. In view of the amendments to claim 1, which as amended is believed to be allowable, claims 10 and 11 which depend directly from claim 1, are also believed to be allowable.

CONCLUSION

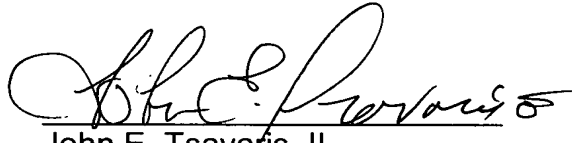
In view of all the above, it is believed that all objections and rejections have been overcome. All pending claims 1-7, 9-12 and 14 are now in condition for allowance.

If for any reason the Examiner believes that contact with Applicants' attorney would advance the prosecution of this application, the Examiner is invited to contact the undersigned at the number given below.

Respectfully submitted,

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By:


John E. Tsavaris, II
Reg. No. 33,804

KENYON & KENYON LLP
One Broadway
New York, New York 10004
(212) 425-7200
CUSTOMER NO. 26646